Course Code and Title	BG7103 Bionanotechnology
Details of Course	**Summary of course content** *(please note that this information provided will also be uploaded to the web for viewing at large)* The course comprises 7 major topics: **1. Introduction to Bionanotechnology** • Introduction to Bionanotechnology, its research and development history, bio-nano devices biomedical applications, Bionanotechnology industry growth, marketing and information resources, challenges and technology trends. **2. Biomolecules and Intermolecular interactions in Bionanotechnology** • Biomolecular components: hydrogen, ions, united atoms, groups and residuals. Biomolecules and their chemical and electronic properties of biological molecules, molecule motion in solutions and electrophoresis, chemical reactions, junctions and membrane transport. Forces between atoms and molecules; Hydrodynamic drag. **3. Nanofabrication in bionanotechnology** • Basic concept of nanofabrication and nano-engineering. Top-down: methods-high resolution lithography. Bottom up: self-assembly technology. DPN-SPM assisted self-assembly nanofabrication. Molecular interaction based self-assembly nanotechnology. Microcontact printing of proteins. **4. Biosensors and bioarray chips** • Different biosensors built by biomolecule sensing components. Basic concept of high-throughput bioarray DNA and protein chips including fabrication, major performance, operation principle and important biomedical applications. **5. Nano micro fluidics – Lab-on-chip systems** • Definition and history. Advantages of micro-fluidic devices. Fluid transport. Stacking and sealing. Materials and fabrication methods. Surface modification. Lab-on-chips application. **6. Bionano Devices** • Protein-based nanostructures. Engineered nanopores. Networks of Neuronal cells. Polymer nanocontainers. Biomolecular motors, DNA-based nanodevices and bionanoelectronics. **7. Nanoanalytics** • Luminescent quantum dots for biological labeling. Nanoparticle labels. Bioconjugated silica nanoparticles for bioanalytical application. Electrochemical labels for biodetection. Surface biology by SPM methods.
	Rationale for introducing this course This core course stipulated by the Division of Bioengineering will be imparted to the postgraduate students, who come from diverse backgrounds and different universities, a solid foundation in and broad understanding of bionanotechnology fundamental and prepare them to conduct their research with greater efficiency.
	Aims and objectives The aim of this course is to provide a deep understanding on the

	fundamental principles, the core technology and main applications of bionanotechnology for graduate students, and to build-up their concepts in nano-scaled design and fabrication for bio-nano systems.	
Assessment	*Final Examination:* *Test / Projects* *Tutorials / Homework*	*60%* *20%* *20%*
	Total:	100 %
Hours of Contact/Academic Units	Lecture hours per week: 2 Tutorial hours per week: 1 *Total: 3 hours / week; 3 AU*	